MEC. SOL. I
LISTA 2

01) $P = 50kN$, $\sigma_{max} = 130MPa$

(I) Calculo ângulos:

- Barra 1: $\tan\alpha = \frac{4,0}{2,5} \therefore \boxed{\alpha = 57,99°}$
- Barra 2: $\tan\beta = \frac{2,3}{3,2} \therefore \boxed{\beta = 35,71°}$

(II) Eq Forças:

- $\Sigma F_x = 0 \Rightarrow F_2 \cos(35,71) - F_1 \cos(57,99) = 0$
- $\Sigma F_y = 0 \Rightarrow F_2 \sin(35,71) + F_1 \sin(57,99) - 50 = 0$
- Resolvendo os sistemas:

$$F_2 = \frac{F_1 \cos(57,99)}{\cos(35,71)} \Rightarrow \left(F_1 \frac{\cos(57,99)}{\cos(35,71)}\right)\sin(35,71) + F_1 \sin(57$$

- $\boxed{F_1 = 40,68kN}$
- $\boxed{F_2 = 26,55kN}$

(III) Calculando os diâmetros:

- $A_1 \geq \frac{40,68 \times 10^3}{130} = 312,96mm^2 \therefore d_1 = \sqrt{\frac{4 \cdot 312,96}{\pi}} \therefore \boxed{d_1 = 19,96m}$
- $A_2 \geq \frac{26,55 \times 10^3}{130} = 204,27mm^2 \therefore d_2 = \sqrt{\frac{4 \cdot 204,27}{\pi}} \therefore \boxed{d_2 = 16,13}$

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02)

- Ponto B: $d_B = 65mm$, $P = 500N$

$$A_B = \frac{\pi \cdot (65)^2}{4} = 3318,3mm^2$$

$$\sigma_B = \frac{500}{3318,3} \boxed{= 150,7kPa}$$

- Ponto C: $d_C = 140mm$, $P =$

$$A_C = \frac{\pi(140)^2}{4} = 15393,8m$$

$$\sigma_C = \frac{500}{15393,8} \boxed{= 32,5kP}$$

- Ponto D: $d_D = 100mm$, $P = 200N$

$$A_D = \frac{\pi(100)^2}{4} = 7854,0mm^2$$

$$\sigma_D = \frac{200}{7854,0} = \boxed{25,5kPa}$$

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03) $P = 5kN$, espessura $t = 50mm$

(I) Eq. Forças:

$\Sigma F_x = 0 \Rightarrow N_{AB}\cos(30) - 5\cos(45) = 0 \Rightarrow \boxed{N_{AB} = 4,082\,kN}$

$\Sigma F_y = 0 \Rightarrow -N_{AB}\sin(30) + 5\sin(45) - N_{BC} = 0 \Rightarrow \boxed{N_{BC} = 1,49}$

(II) Áreas:

- AB ($L = 40mm$): $A_{AB} = 40 \cdot 50 = 2000mm^2$
- BC ($L = 50mm$): $A_{BC} = 50 \cdot 50 = 2500mm^2$

(III) Tensões:

- $\sigma_{AB} = \frac{4082}{2000} \Rightarrow \boxed{\sigma_{AB} = 2,041\,MPa}$
- $\sigma_{BC} = \frac{1494}{2500} \Rightarrow \boxed{\sigma_{AB} = 0,598\,MPa}$

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04) $P = 8kN$, $\theta = 60°$, $d_{AB} = 4mm$, $d_{BC} = 6mm$

(I) Eq. no nó B:

$\Sigma F_y = 0 \Rightarrow F_{BC}\sin(60) - 8 = 0 \Rightarrow F_{BC} = 9,237kN$

$\Sigma F_x = 0 \Rightarrow -F_{AB} + F_{BC}\cos(60) = 0 \Rightarrow F_{AB} = 4,619kN$

(II) Áreas:

- $A_{AB} = \frac{\pi(4)^2}{4} = 12,566mm^2$
- $A_{BC} = \frac{\pi(6)^2}{2} = 28,274mm^2$

(III) Cálculo de tensões:

- $\sigma_{AB} = \frac{4619}{12,566} \Rightarrow \boxed{\sigma_{AB} = 367,0\,MPa}$
- $\sigma_{BC} = \frac{9237}{28,274} \Rightarrow \boxed{\sigma_{BC} = 326,7MPa}$

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